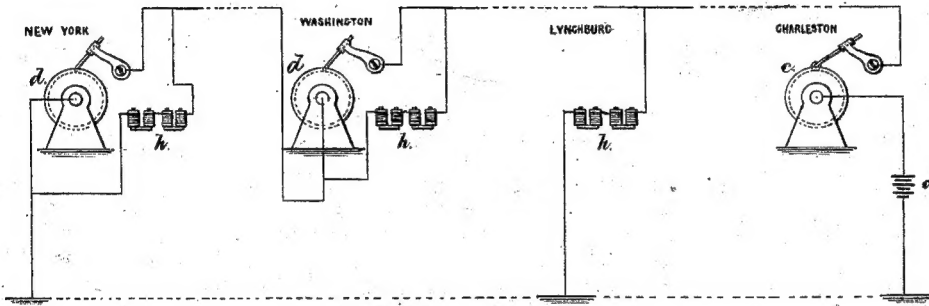


T. A. EDISON.

Circuits for Chemical Telegraphs.

No. 135,531.

Patented Feb. 4, 1873.



Witnesses,

*Geo. D. Walker*  
*Chas. H. Smith*

Inventor

*Thomas A. Edison,*

*Lemuel W. Serrell*  
att'y

# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF NEWARK, NEW JERSEY, ASSIGNOR TO HIMSELF  
AND GEORGE HARRINGTON, OF WASHINGTON, D. C.

## IMPROVEMENT IN CIRCUITS FOR CHEMICAL TELEGRAPHS.

Specification forming part of Letters Patent No. 135,531, dated February 4, 1873.

*To all whom it may concern:*

Be it known that I, THOMAS A. EDISON, of Newark, in the county of Essex and State of New Jersey, have invented an Improvement in Circuits for Chemical Telegraphs, of which the following is a specification:

Before this invention telegraphic circuits had been arranged with a rheostat to regulate the portion of the electric pulsation passing to the chemical paper, and allowing the other portions of the pulsation to pass along upon the main line, or to go to the earth as a leakage. In these cases the rheostat did not produce any counter current, and served only to direct portions of the electrical waves through the chemical paper, but the tailing and the attenuation of the mark was not avoided, and upon long lines these marks usually ran together, because there was not sufficient time for the electric action to cease, or the line to free itself before another pulsation succeeded and the line became surcharged. In all cases it has been desired to obtain the most perfect insulation of the line to avoid the use of powerful batteries and to lessen atmospheric influences. It has, however, been found that when the insulation is impaired by atmospheric influences, the marks upon the chemical paper are more distinct, because the surplus electricity finds vent in currents to the earth, lessening the tailing.

When an electro-magnet is charged by a pulsation the electric action, in the circuit of which the helix of the magnet forms a part, is augmented; but when the main or line current is broken the magnet, in discharging itself of the magnetism that has been induced, sets up momentarily a counter current or one of opposite polarity. I avail myself of these various conditions, and arrange the circuits in such a manner that the electro-magnets which are energized by the pulsation that makes the mark on the chemical paper, serve to intensify the electric action upon that paper; but that the counter current, set up when the primary circuit is broken, shall neutralize the tailing or attenuation of the current by the discharge of the magnetism from the electro-magnet, thereby allowing for the use of very feeble currents and rendering the marks upon the chemical paper sharp and clear; and I furthermore em-

ploy upon long lines one or more earth connections, in which are placed one or more electro-magnets, with or without rheostats to regulate the proportion of currents passing to the earth, such connections and electro-magnets serving to free the line from surplus electricity and by the reverse polar action, as the electro-magnet discharges itself, to free the line from any attenuation of the primary pulsations.

With long lines it is preferable to employ long electro-magnets; and the reverse, in order that the time occupied by the magnet in discharging its magnetism may be proportioned to the attenuation or tailing of the main current that is increased by the length of line.

In the diagram annexed I have illustrated my improvement by four stations, New York, Washington, Lynchburg, and Charleston. The message is being sent from Charleston to New York by the battery *a*, and any suitable transmitting instrument at *c*, such as a stylus and perforated paper, or a finger-key or other device. The battery may be connected with either the positive or the negative pole to the instrument, and the other to the earth wire. At New York is any suitable receiving instrument, at *d*, such as a drum and stylus, for the chemical paper. If intermediate connections are not required they may be dispensed with and the message will be received only at New York.

I provide a secondary or local circuit connected with the main circuit at both sides of the receiving instrument *d*, and in this I place the electro-magnets *h*. These and the others spoken of may be of ordinary character; but as quantity rather than intensity is required, large wires may be used for the helices, and solid bars, bundles, or tubes for the cores, and many of these may be employed, or a large number may be provided, and more or less may be brought into action by switches or a commutator. The helices might be of iron wire wound in several layers, and cores be dispensed with, the inner portions of the coils forming the electro-magnets.

When the circuit is closed and a pulsation passes in the main line, a local circuit will thereby be set up through the electro-magnets and connections in the same direction as that of the main-line, and thereby intensifying the

action upon the chemical paper, but as soon as the main-line circuit is broken the electro-magnets in discharging themselves set up a local circuit in the opposite direction through the stylus and chemical paper, neutralizing any tailing and causing the mark to be clear and distinct. The same effect is produced where the connections are arranged as at the station marked Washington, in order that a drop copy may be taken at that point.

At the station marked Lynchburg the electro-magnets *h* are placed in a branch or ground circuit, and the amount of the leakage regulated by the resistance of the magnets themselves, or of a rheostat, thereby conveying away, designedly, the proper portion of the current intermediately between the sending and the

receiving station; and when the circuit of the main line is broken the electro-magnets set up a counter-current in the line as they discharge themselves, thereby freeing the line at one or more places, as circumstances require.

I claim as my invention—

One or more electro-magnets, arranged in a local or branch circuit, substantially as set forth, in combination with a chemical telegraphic receiving instrument, for the purposes set forth.

Signed by me this 9th day of November, 1872.

THOMAS A. EDISON.

Witnesses:

GEO. D. WALKER,  
GEO. T. PINCKNEY.